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hundred thirty-three more packages than he otherwise would out of a ton of raisins. Some other common package foods weighing less than the pound or aliquot part of a pound, are: seedless raisins, fifteen ounces; currants, seven or eleven ounces; evaporated milk, fifteen ounces; condensed milk, another brand, fifteen ounces; macaroni, seven ounces; another brand of macaroni, seven ounces; baked beans, eleven ounces; and so on. The same tendency to pack liquid food products in less than ½ pints, pints, or quarts, exists.

It is very satisfactory to note that probably nine-tenths of the packages containing foods are of full weight or an aliquot part of the full pound. It is hoped that public opinion will press so hard on a few of these manufacturers that are still not in line, that they will join the majority. Some packers have tried to avoid the embarrassment that follows the discovery that their packages are not up to full weight, especially in foods that are liable to lose weight in drying, by the statement, "this package was of full pound weight when packed", but that is rather a dangerous statement, certainly liable to lead to complications. A reasonable variation from the stated weight or measure of products is allowable, but this variation should be as often above as below the quantity stated.

Water Solubility an Economic Force

Paper 26 of thte 1925 Meeting at Manhattan

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The geologist will tell you that erosion is one of the great forces that has been used to shape the earth into its present form; that it has entirely transformed the surface; that it has cut out mighty valleys, has scoured away mountain ranges, covered the plains with fertile soil and extended the surface of the continents far out into the sea. This is all true; the water-borne detritus has accomplished wonders. Without the aid of this erosion but a small portion of the surface of the earth would be habitable—the waving fields of grain would never have been possible.

While erosion in the geologic ages long past, was doing this, something else was going on, for the agent that did this stupendous work, was also a solvent. Water is not by any means the only solvent, although it has been called "the universal solvent", but it is possessed of this property to such a wonderful extent that the secondary results of the erosion are of the utmost importance.

In the process known as "levigation" the artisan reduces his material to an impalpable powder by grinding with water. In this way the graphite and the clay used in making the different grades of lead pencils are ground with water, day after day in a kind of mortar, to bring them to the desired condition of impalpable dust. So also, the rocks and gravel and sand have been ground together, in this process of erosion, as they have been hustled down the mountain sides, and as the pieces become smaller, the surface of the mass has been increased, and the opportunity for the solvent action of water has by tthe same measure been increased.

Contained in this mineral material that the waters have carried by gravity to lower levels, are the mineral substances of which the crust of the earth is composed, and these materials are not like so much sand—good for scouring and nothing else—for the water immediately, as soon as it gets into contact with the load which it has been comissioned to carry down the valleys, begins to attack it, and to dissolve minute quantities of the material. To its aid, in this task comes the carbon dioxide of the air as a sort of an accomplice to help boost in the process.

Thus the lime, the magnesia, the sulfates, phosphates and chlorids, and particularly the compounds that the still more soluble—namely the sodium and potassium minerals begin to disintegrate. Even such a seemingly stable material as feldspar—a silicate of potash or soda, lime, aluminum, iron, and magnesia, begins to fall to pieces for the water has dissolved the more soluble ingredients.

Though the water may have started from the clouds, and struck the earth on the mountain top, in almost virgin purity, it soon begins to show traces of the mineral substances that it has picked up in its race towards the sea. When this water soaks into our wells, we call it hard water, because it haas absorbed so much mineral matter in its journey which it will not readily give up. By a process of evaporation the water may be induced to leave a part of its new-found companions in a soluble form in the soil, but the mineral materials will never wholly desert the water. They are there to stay. Only from a saturated solution will the mineral salts crystalize out.

It has sometimes happened that this mineral-saturated water collects in a depression in the earth. It cannot escape by any river or other outlets. More water also soil-saturated comes in—this process continues for centuries, and as some of the water, tiring apparently of its association with the baser mineral matter, allows the sun to pick it up, and carry it away in fleecy clouds, the lake, as we now recognizes it, becomes more fully saturated with mineral material—with the more soluble of the minerals of the earth's crust—and finally we have a SALT LAKE. Let the process go still farther, until all the wter is evaporated, and a bed of mineral matter remains—a bed of rock salt perhaps. This is ultimately covered with detritus, the result of further erosion and a salt bed deep below the surface is formed.

We left the rivers, carrying with the suspended material their load of soluble material to the sea. Here again the process of concentration goes on—so that finally all the elements, a little of each in proportion to their solubility, are stored in the ocean. Some organic material goes along with mineral matter but the low forms of plant and animal life are awaiting the arrival of this refuse from the land, and utilize it in their growth. The higher forms of animal life feed on these lower organisms, so the total organic life does not increase, as do the mineral constituents of the sea.

What is really but a drop in the bucket, is the addition to the ocean of all the sewage, and refuse, of the cities along the shore, The great fishing banks along the shore of New Foundland, and in the English Channel, are but illutrations of the way in which this organic matter is taken care of ir the feeding of the vegetable and animal life of the sea.

What a wonderful sanitary agent is the salt sea, twice every 24 hours it flushes out the slips, and docks, and sewers, of a great city. The sea is after all but a slave of the sun and moon. It would be difficult to compute the quantity of refuse that in a much more efficient way than any garbage commission could ever accomplish the work, is thus daily taken care of by the sea.

Going back to our mineral-saturated, or partially saturated streams, that have poured their load into the salt water, let us ascend to their sources. On the mountain sides, in the valleys, beside the streams, we find the beginning of the so-called "mineral waters". The water has percolated into some deposit of lime or magnesium carbonate, some iron deposit, some sulfurous cavern, and comes to the surface bringing its load of mineral material. This is the mineral spring or saline well. Perhaps the water was under pressure down there; if so it may have come to the surface sparkling with carbon dioxide gas, it is an effervescent water. If this hidden source is filled with decomposing sulfur and iron compounds, the whole air of the country side is scented with the fumes. Invalids flock to these sulfur springs for rejuvenating and healing baths.

If, on the other hand, the water has flowed over quartzite, or granite or even a trap rock, it has not been able to pick up much mineral matter—it is a pure water, adapted for use as a "table water" like the Poland Springs of Maine. It is however a valuable therapeutic agent, for frequently all the patient needs is plenty of pure water, to flush out the system.

Aside from the therapeutic action of mineral waters, which it is not our purpose here to discuss, the soluble materials originally picked up by the waters, and often again deposited, are of the greatest importance in our economic life. Consider, for instance many of the copper deposits, especially the carbonates; they were evidently at one time in solution, and when conditions of evaporation heat or pressure changed these copper salts were deposited as veins of ore, which later became covered with the weight of mountains of other rock perhaps, but this, when discovered and utilized by man, becomes an important copper mine. The same thing is true of iron, for many of the most important iron ores, show their aqeous origin. The iron was once in solution in water. This is especially noticeable in the carbonates and oxides such as limonite, siderite and even the very abundant oxide of iron known as specular ore. The same conclusion as to its origin, must be reached if we ask where the zinc carbonate comes from, or perhaps also the common sulfide or zinc blende. You say that we do not find often now-a-days mineral springs, containing copper or zinc; this is true, but the conditions are so different now from what they were in the earlier ages, when the surfce was being worked over more than at present, and before the gigantic upheavals of the mountain ranges, took place.

The limestones have been deposited by the action perhaps of the minute aquatic organisms or crustacae, but the lime was first brought into solution, by the water, before the minute organisms could utilize it, and the same thing is true of magnesia. It may seem a long time since the Carrara marble was in solution in the waves that dash against the Mediterranean shores, or since salt water was near enough to the Vermont Marble quarries to furnish the lime for the construction of the rock, but we must recognize the aqueous source of all this material.

Scattered about in large areas in different parts of the country, far away often from the present ocean shore, are great beds of gypsum so important as a source of fertilizer and for the making of plaster of Paris. We do not attempt to say how long it is since the material of these beds was in solution in the surrounding waters but it was there, and we must acknowledge the source. The same thing is also true of the Barites deposits, of the potassium and magnesium and soda salts of the Strassfurt mines in Germany and the phosphate beds of the Carolinas.

When the aluminum manufacturers looked about for a material suitable for making the metal, which now has become almost indispensable for the manufacture of cooking utensils, aluminum bronze, or for some strong, light material for the frames of aeroplanes, they chose bauxite, the clay-like aluminum iron hydroxide, because it was readily adapted for smelting in the electric furnace. It is true that feldspar was a much more abundant, and a cheaper rock containig aluminum, but it has not been found practical to use in the aluminum furnace. No doubt the elements of bauxite, originally occurred in feldspar, or other minerals found in the granite rocks, but it had to be taken out by water and concentrated, so to speak, in the form of a simple oxide before it was available.

Numerous other illustrations of this kind might be cited, but they all point to the tremendous importance of the work of the water in adapting the earth for the use of man, which has occurred coincident with the grinding and disintegrating action of erosion.